Dow Construction Chemicals

Ask the Expert: Michael Bowe, Senior Chemistry Specialist

Why in the world would anyone make a canoe out of concrete?

It might seem bizarre, but a boat made of concrete is really no stranger than one made of steel. Both materials are heavier than water, but if you have a good design, concrete and steel boats will displace water and float.

Each year, the American Society of Civil Engineers (ASCE) sponsors a National Concrete Canoe Competition (NCCC) – the "America's Cup of Civil Engineering." The NCCC gives students a chance to apply engineering principles learned in the classroom to a practical setting that demands technical and project management skills they will need during their careers. "The event challenges the student's knowledge, creativity and stamina, while showcasing the versatility and durability of concrete as a building material," according to ASCE/NCCC (http://content.asce.org/conferences/nccc2010/). Winners are chosen based on race results, design and construction, and written and oral reports.

Five years ago, the University of Wisconsin-Madison NCCC team contacted Dow about using one of our emulsion polymer cement modifiers. We donated a supply of RHOPLEX™ MC 1834 acrylic polymer cement modifier, which they tested and used to help them win the NCCC in 2005, as well as in 2006 and 2007. This year, the University of Nevada-Reno asked us specifically for a sample of RHOPLEX DLP 210 redispersible polymer (RDP), which provides similar performance characteristics. They placed second this year, and Wisconsin- Madison placed fifth.

Polymer cement modifiers provide several properties the students want in their canoes: adhesion to enable multiple layers of concrete; flexural strength to enable thin, durable, lightweight canoe bottoms and sides; water resistance; and impact and abrasion resistance. These same properties are critical in many more practical applications, such as patch and repair mortars, ceramic tile adhesives, and other thin cement mixtures that are employed for various decorative and repair uses. Regular concrete will not stick to old concrete, for instance, so polymer modifiers provide excellent adhesion for patching sidewalks, roads, driveways and other concrete structures. Impact and abrasion resistance are also critical for any concrete structure that experiences routine vibrations, such as roads, bridges and buildings. Water resistance is important to any structure that goes through freeze/thaw cycles, because ice inside the concrete can cause cracking. Like concrete itself, polymer modifiers are very versatile.

Dow Construction Chemicals is pleased that our polymer modifiers play a small role in helping these NCCC teams achieve success, but we can't take too much credit. Dow does not provide the students with technical advice – they do all the research and development themselves, which is the whole point of the NCCC program. But we are very glad to support this innovative, sophisticated, slightly unusual student competition, which demonstrates the versatility of concrete – the most widely used building material in the world.

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